



Infaunal tissue QAPP

Susan McGroddy

to:

Ravi Sanga

12/08/2008 02:22 PM

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## 2 Attachments



Draft final Invertebrate QAPP\_12-08\_for EPA approval.doc Response to 2008Oct10\_Benthic QAPP comments.doc

Ravi,

Here is the draft final Infaunal tissue QAPP and a response to comments. All revisions to the document have been made in redline. Please let me know if you have any additional questions or concerns.

Thanks.

Susie

**USEPA SF**



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## EPA Reviewer Comments – Draft QAPP Benthic Invertebrate Tissue/Gastropod Collection (October 2008)

Comment Number	Page No.	Section No.	Comments
1	General	General	<p>Any comments on the RBC and ACG appendices will be submitted by EPA under separate cover.</p> <p><b>Response: Comment noted, although no comments have been received to date.</b></p>
2	General	General	<p>General comment: There has been discussion of whether fall 2008 is the most appropriate season to sample due to the possibility of reduced biomass. Regardless of the final decision on that question, please add language indicating that if one sampling event is insufficient to characterize chemical concentrations in benthos, an additional sampling event at a more optimal time (April to June) will be considered in consultation with EPA.</p> <p><b>Response: Several Puget Sound benthic studies report maximum infaunal abundance in fall and winter (Nichols 1975, Word et al. 1983, Tetra Tech 1987). Data from the Chesapeake Bay estuary suggests infaunal biomass may also be at a peak in fall and winter (Alden et al. 1997). Benthic invertebrate sampling in the early fall is likely to be a reasonable time period for benthic invertebrate tissue collection in EW. Annual species that have recruited to the system in the summer have had a number of months for growth; in addition, there is generally a secondary peak spawning and recruitment period in the fall for benthic species that will further enhance available benthic tissue. The need for any additional tissue collection will be discussed with EPA should the fall sampling event provide insufficient tissue mass.</b></p> <p>Chemical concentrations in benthos can vary seasonally. Please add a discussion to explain why the sampling event cannot be coordinated when the applicable receptors (like juvenile Chinook) are feeding. For bioaccumulative chemicals, particularly those that biomagnify, late in the season would provide a greater representation of biomass. Are there any data from around Harbor Island that may help answer these questions? Please provide EPA a response to these considerations, and revise the QAPP as appropriate.</p> <p><b>Response: A fall sampling event for benthic tissue is likely to represent a maximum exposure/body burden in any adult benthic invertebrates that are present due to the extensive biological activity (feeding, growth, reproduction, etc) they have undergone during the spring and summer months and is therefore a conservative estimate of exposure of benthivorous predators. Juvenile Chinook are currently proposed to be collected in 2009; stomach contents of some specimens will be analyzed to further assess dietary exposure of juvenile salmonids. Variations in benthic tissue vs stomach contents can be discussed relative to the range of potential dietary exposures for benthivores.</b></p>
3	General	General	<p>In general, a more robust discussion of the sampling design and use of the data is needed. As the QAPP is written, the sampling design seems to be heavily influenced by the level of effort required, as opposed to being driven by the number of samples or mass required. There should be a balance between these two factors.</p> <p><b>Response: The text has been revised to balance level-of-effort and tissue requirements for collection of benthic invertebrate tissue.</b></p> <p>Please add more information describing how the number of samples was established. In addition, the schedule for sampling is not optimal for tissue collection. The same level of effort during a more optimal time of year could result in a more representative sampling effort. Please add a rationale as to why sampling at the proposed time is the most preferable and how seasonality may affect the results.</p> <p><b>Response: Additional information will be added regarding number of samples. Please also see response to Comment #2,</b></p>

4	General	General	<p>EPA understands that the EWG revised sampling approach consists of:</p> <ul style="list-style-type: none"> <li>• Preferential use of a van Veen to obtain co-located sediment samples.</li> <li>• One sample per area (areas were re-defined during the 10/10 conference call).</li> <li>• A prescribed minimum number of grabs collected from each area initially to evaluate whether adequate tissue may be collected by additional grabs.</li> <li>• All polychaetes (worms) will be retained, and clams greater than 2 cm would be separated for possible separate analysis.</li> </ul> <p>EPA concurs with this sampling approach</p> <p><b>Response: The QAPP has been revised to reflect these agreements.</b></p>
5	General	General	<p>Please revise the QAPP to include a brief discussion about ways to reduce the tissue mass required for analysis. Please reference Portland Harbor efforts, where this has already been accomplished (30 g of tissue were required).</p> <p><b>Response: Tissue requirements have been reduced; rather than discuss ways to reduce mass requirements, the new tissue mass goals have been included in the QAPP.</b></p>
6	Map 2-1	Map 2-1	<p>Please provide Map 2-1 for review.</p> <p><b>Response: A map will be provided for review.</b></p>
7	Map 3-1	Map 3-1	<p>Please revise the map for consistency with the agreements reached during the 10/10 conference call between Windward and EPA. EPA understands that the new sampling approach will now include 12 separate sampling areas.</p> <p><b>Response: A revised map will be provided for review.</b></p>
8	6	2.2	<p>3<sup>rd</sup> paragraph: Please provide some explanation regarding the applicability of the LDW COPC list for the EW.</p> <p><b>Response: The EW is influenced by Duwamish River sources and historically had similar industries and activities along and within the waterway as those found throughout the Lower Duwamish Waterway. Contaminant fate and transport processes within the EW are expected to be similar to those that occur in the Lower Duwamish Waterway (LDW) and many of the same receptors that are found in the LDW also use the EW. Therefore, the LDW contaminant of potential concern (COPC) list is a reasonable starting point for selecting chemicals for analysis and evaluation. The COPCs will be refined based on the results of a screening level risk assessment that is described in the human health and ecological risk assessment technical memoranda. This process does not preclude identification of additional COPCs. The text has been amended to make it clear that the approach for assessing chemicals by tissue residue and dietary exposure is consistent with the approach taken in the LDW.</b></p>

9	6	2.2	<p>3<sup>rd</sup> paragraph: This comment must be addressed in the risk assessment, but some discussion can be included in the QAPP as well. Given the season that sample collection is proposed, please explain how comparable invertebrate composites are to diets of ROCs. Benthic invertebrate chemical concentrations will be used for dietary exposure to certain ROCs. Please include a discussion regarding the comparability of the composites to ROC diets. For example, some ROCs may be primarily epibenthic feeders. Please explain the likelihood that either sampling technique will capture many epibenthic invertebrates.</p> <p><b>Response: EW ROCs that are benthivorous predators likely feed preferentially on organisms that live on the sediment surface rather than within the sediment due to their greater accessibility. However, epibenthic organisms are spatially and temporally heterogeneous (when and where they occur varies widely), making infaunal organisms an important source of food for benthic predators.</b></p> <p><b>Epibenthic organisms feed primarily on benthic diatoms and organic detrital material that either collects on the sediment surface or is transported within the relatively thin benthic boundary layer (a proportion of epibenthic organisms prey on other epibenthos). Infaunal organisms share the same food source and many of the same feeding strategies, although more time is spent within the sediment column and these organisms are typically exposed to porewater to a greater degree than epibenthic organisms. A significant proportion of the infaunal community will feed on sediment-bound organic material (including fungus, bacteria, diatoms) below the sediment-water interface, using various strategies to flush wastes and oxygenate their deeper burrows or tubes. Because of their greater association with the sediment, the sediment exposure pathway plays a more significant role in uptake of contaminants in infaunal organisms.</b></p> <p><b>While benthic grab or sledge samplers will collect both epi- and infaunal organisms, the majority of those that will be retained on a 1mm mesh screen will be infauna. The body burdens of infaunal organisms will be a conservative estimate of the diet of benthivorous predators/ROCs because of their greater exposure to sediment.</b></p>
10	6	2.2	<p>4<sup>th</sup> paragraph: TBT has a chemical standard under the DMMP framework. Please revise the second sentence to add the bolded text, "... which does not have a chemical standard <b>under SMS.</b>"</p> <p><b>Response: A clarification that TBT does not have a bulk sediment chemical standard has been added to the text.</b></p>
11	7	Table 2-1	<p>Under data use for benthic invertebrate tissue, in addition to comparing the 95th UCL to tissue TRVs, the individual samples should be compared. Please revise the table accordingly.</p> <p><b>Response: The table has been modified.</b></p>
12	7	2.2	<p>2<sup>nd</sup> complete paragraph: Given that these data are to be used as a dietary component for juvenile Chinook, please provide an explanation to support sampling in the fall as opposed to sampling the benthic community closer to the time juvenile Chinook will be using the EW.</p> <p><b>Response: Please see response to comment #2.</b></p>
13	7	2.2	<p>In addition to imposex, intersex is another TBT-induced phenomenon in certain gastropods, which is associated with gross malformations of the oviduct. Gastropods susceptible to imposex at sufficiently high TBT concentrations are different than the gastropods susceptible to intersex. Please add whether there have been any evaluations or discussions on whether intersex would be a more appropriate biomarker of effects in EW gastropods? Note that Table 2 in Meador et al. (2002) does cite one critical body residue for intersex. Please address this issue in the QAPP.</p> <p><b>Response: Intersex will be evaluated, where possible, in the same gastropods evaluated for imposex.</b></p>
14	8	2.3.3	<p>Please add the target number of grab samples per tow of the benthic sledge and provide a rationale for the number of grabs.</p> <p><b>Response: The collection of benthic invertebrate tissue was changed, per discussion with EPA, to rely upon grab rather than sledge samples. This comment is not currently applicable. The number of sediment samples to represent benthic invertebrate tissue collection areas was intended to address a reasonable estimate of a mean and 95<sup>th</sup> UCL to represent benthic invertebrate exposure from an sledge area—10 grabs per area was the goal</b></p>

15	9	2.3.3	<p>Please provide additional text (and/or example) to explain the following sentence: "The mean sediment concentrations for the sledge sample will be calculated as the area-weighted average concentrations within that area." Please explain if this sentence means that if multiple sledge tows occur in one area, the mean sediment concentration of all sledge samples will be combined to get a SWAC for the Area (capitalized to note the specific Area compartments for this sampling event).</p> <p><b>Response: This approach will not be implemented, per discussion with EPA. Therefore, this text will be removed from the QAPP.</b></p>
16	13	2.6.4	<p>The data report should include the SMS criteria directly alongside the appropriate chemistry data for comparison. Please revise the text accordingly.</p> <p><b>Response: Text has been modified.</b></p>
17	14	3.1	<p>The text (p 20, 3.2.3) states that up to five tows will be attempted. Please explain the cut off point for doing less than 5 tows and whether the cut off depends on the targeted sample mass required. Please also explain if other criteria will be used. Please explain the proposed method for compositing among the samples collected by the 5 tows. Could there be up to 5 composites, one per tow? Some of these comments are related to text in section 3.2.3. However, it would be appropriate to include this level of detail in the sample design section 3.1. Please add the requested discussion.</p> <p><b>Response: This approach will not be implemented, per discussion with EPA. Therefore, this text was removed from the QAPP.</b></p>
18	14	3.1	<p>"Characterization of sediment quality in invertebrate collection areas will rely primarily on the surface sediment collection effort that is the subject of a separate QAPP and will provide single point spatial data." The EWG is emphasizing use of the sledge, which will cover large swaths via tows. How will single point spatial data be useful in this context? Is the EWG proposing to analyze sediment by single points? Please provide additional explanation in the text.</p> <p><b>Response: This approach will not be implemented, per discussion with EPA. Therefore, this text was removed from the QAPP.</b></p>
19	15	3.1	<p>As discussed during the 10/10 conference call, please revise the text to subdivide the currently-defined Area 4 into four separate sampling areas. This should bring the total number of sampling areas to 12. EPA understands that the EWG intends to re-label these sampling areas to reduce potential confusion.</p> <p><b>Response: Text and figures were modified to reflect this agreement.</b></p>
20	15	3.1	<p>The statement that the waterway beneath the bridges near the south end of the EW is inaccessible to sampling vessels is not accurate. EPA understands that the sampling vessels capable of navigating beneath the bridges is limited, however statements that this area is inaccessible should be removed from the text.</p> <p><b>Response: Text has been modified.</b></p>
21	15	3.1	<p>Biomass is likely to be optimal between April and July due to maximum recruitment during that period. October would not necessarily be the preferred time to take samples, because biomass has decreased from spring-summer. (Personal communication with Si Simenstad, 9/25/08). Please add a discussion of the optimal times for collecting biomass. EPA reserves the right to require additional sampling in the optimal window if adequate biomass is not collected.</p> <p><b>Response: While epifaunal organisms may decrease in abundance in the fall, infaunal organism abundance and biomass may actually be at its peak. Please see response to Comment #2.</b></p>
22	15	3.1	<p>Benthic invertebrate chemical concentrations will be used for dietary exposure to certain ROCs. Optimal feeding is in the summer months for fish when there is more biological activity and availability of organisms for feeding. If the benthic organisms are being collecting in part to assess risk, please explain why invertebrates are being collected in late October outside the optimal feeding window. The risk assessments should include a discussion of this inconsistency and a justification for sampling in October should be provided, whether it relates to the risk assessments, schedule, etc.</p> <p><b>Response: Please see response to Comment #2. Additional explanation has been added to the QAPP.</b></p>

23	15	3.1	<p>Please revise the text for consistency with the agreements reached during the 10/10 conference call. EPA expects that a minimum of 10 grabs with the double van Veen will be collected in order to determine whether or not to collect additional grabs. The decision to collect additional grabs versus collecting the remaining tissue mass requirements with the benthic sledge will be made in consultation with EPA. Please note that grab sampling may stop once the target tissue mass is achieved, regardless of whether 10 grabs have been collected.</p> <p><b>Response:</b> <i>Text has been revised to reflect agreements reached with EPA during the above referenced conference call.</i></p>
24	16	3.1	<p>Please revise the second complete sentence to indicate that the decision to switch over to the benthic sledge will be made in consultation with EPA.</p> <p><b>Response:</b> <i>Text has been revised to reflect agreements reached with EPA during the above referenced conference call.</i></p>
25	17	3.2.1	<p>Please provide an explanation for collecting clams &gt; 2cm and separating these clams from the market basket samples. Please note if clams less than 2 cm will be included in the general invertebrate tissue sample.</p> <p><b>Response:</b> <i>Consistent with the approach implemented as part of the LDW, clams greater than 2 cm will be separate from the benthic tissue composite because larger clams are not considered representative of the target prey items of most benthivorous ROCs. These clams will be saved and archived for potential analysis, following discussion with EPA. All other clams will be retained as part of the benthic invertebrate tissue composite.</i></p>
26	19	3.2.3	<p>Please provide more information on the 2 cm criteria identified in the QAPP. This issue was addressed during the 9/30 conference call, when it was agreed that the 2 cm criteria applied only to shellfish. Please revise the text accordingly and also explain what is being done with clams greater than 2cm.</p> <p><b>Response:</b> <i>Please see response to Comment #25. This exclusionary criterion only applies to clams.</i></p>
27	19	3.2.3	<p>Please add text to indicate that the decision to switch over to the benthic sledge will be made in consultation with EPA.</p> <p><b>Response:</b> <i>Text has been revised to reflect agreements reached with EPA during the 10/10 conference call.</i></p>
28	19	3.2.3	<p>Please describe how the EWG proposes to composite tissue collected during multiple van Veen grabs, as well as the associated co-located sediment samples.</p> <p><b>Response:</b> <i>Tissue from each sampling area will be composited in the field. A tissue compositing proposal will be developed following the tissue collection event should insufficient tissue (&lt;50 grams) be collected from any one area. Individual sediment grab samples will be homogenized and equal aliquots will be subsampled and combined into a single composite to represent a given sampling area, per agreement with EPA.</i></p>
29	19	3.2.3	<p>Please revise the first sentence of the second to last paragraph to reflect the agreement reached during the 10/10 conference call. EPA understands that a minimum of 10 grabs will be deployed in each sampling region, unless the target tissue mass has been achieved in fewer grabs.</p> <p><b>Response:</b> <i>Text has been revised to reflect agreements reached with EPA during the 10/10 conference call.</i></p>
30	20	3.2.3	<p>If the benthic sledge is used, the text states that up to five tows will be attempted. Please explain the cut off point for doing fewer than 5 tows and whether the cut off depends on the targeted sample mass required. Also, please explain whether other criteria will be used.</p> <p><b>Response:</b> <i>The number of tows was intended to balance tissue requirements for chemical analyses vs the level of effort to collect sufficient tissue. Five tows were considered spatially representative of each of the sampling areas; fewer tows would be conducted if tissue mass goals were met.</i></p> <p>Please explain the proposed method for compositing among the samples collected by the 5 tows. Could there be up to 5 composites, one per tow? Please add the requested discussion.</p> <p><b>Response:</b> <i>The benthic sledge will not be used to collect tissue; therefore, this comment will not be addressed.</i></p>

31	20	3.2.3	<p>Please elaborate on the 2 cm criteria identified in the QAPP. This issue was addressed during the 9/30 conference call, when it was agreed that the 2 cm criteria applied only to shellfish. Please revise the text accordingly.</p> <p><b>Response:</b> <i>Please see response to Comment #26. This appears to be a duplicate comment.</i></p>
32	23	3.4.1	<p>Please discuss how clam species other than <i>Macoma spp.</i> (&gt;2 cm shell diameter) will be archived/analyzed.</p> <p><b>Response:</b> <i>All clam species will be archived separately, according to the area and grab where they were sampled. Analysis will be dependent on available tissue and agreements reached with EPA.</i></p>
33	29	3.5.2.1	<p>Equation 2 seems to have some sort of formatting issue. Please correct this problem.</p> <p><b>Response:</b> <i>The format will be reviewed, and corrected, if warranted.</i></p>
34	38	4.2	<p>Please indicate that the progress reports will be provided to EPA for review and that additional action could be taken as determined by EPA.</p> <p><b>Response:</b> <i>Text will be modified to include EPA submittal.</i></p>